PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Form PCT/IPEA/416
115958PLAY1		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/NO2004/000008	14.01.2004	14.01.2003
International Patent Classification (IPC) or national classification and IPC		
C09K19/54		
Applicant		
POLYDISPLAY ASA		

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. ☐ *sent to the applicant and to the International Bureau)* a total of sheets, as follows:
      ☐ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
   b. ☐ *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

☒	Box No. I	Basis of the opinion
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

Date of submission of the demand	Date of completion of this report
11.08.2004	08.03.2005
Name and mailing address of the international preliminary examining authority:	Authorized Officer
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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/NO2004/000008

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
   - ☐ international search (under Rules 12.3 and 23.1(b))
   - ☐ publication of the international application (under Rule 12.4)
   - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

   Description, Pages

   1-9 as originally filed

   Claims, Numbers

   1-9 as originally filed

   ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
   - ☐ the description, pages
   - ☐ the claims, Nos.
   - ☐ the drawings, sheets/figs
   - ☐ the sequence listing *(specify)*:
   - ☐ any table(s) related to sequence listing *(specify)*:

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.
PCT/NO2004/000008

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-7,9
	No:	Claims	8
Inventive step (IS)	Yes:	Claims	1-7
	No:	Claims	8,9
Industrial applicability (IA)	Yes:	Claims	1-9
	No:	Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V.

1. State of the Art

The following documents (D) are referred to in this communication; the numbering will be adhered to in the rest of the procedure:

D1 : US 5 976 405 A (CLIKEMAN ET AL) 2 November 1999 (1999-11-02)
D2 : US 6 160 061 A (BERGE ET AL) 12 December 2000 (2000-12-12)
both cited in the application

2. Novelty (Article 33(2) PCT) , Inventive Step (Article 33(3) PCT)

2.1.
Document **D1**, which is considered to represent the most relevant state of the art, discloses (examples 1-11; claims 1-17) a method for forming uniformly sized domains comprising: a) forming a pre-seed particle by polymerizing one or more first ethylenically unsaturated monomers; b) forming an emulsion of seed particles by aqueous emulsion polymerization, in the presence of said pre-seed emulsions of one or more second ethylenically unsaturated monomers; c) adding to said emulsion of seed particles one or more liquid crystal materials to form an emulsion of seed particles and liquid crystal; and d) causing said liquid crystal material and seed particles to form substantially monodisperse domains containing liquid crystal, said domains having domain sizes from 0.150 microns to 15 microns in diameter and a polydispersity from 1.3 to 1.0. Polymer particles of **D1** containing liquid crystal domains, or containing another organic liquid, may be combined with liquid crystal material, preferably the same liquid crystal which is contained within the particles, to form a mixture. There may be present in the liquid crystal additives such as dispersants or thickeners. The mixture may then be used to form a film or fill a display device.

The subject-matter of **claim 1** therefore differs from document **D1** in that:
(a) an aqueous emulsion with narrow size distribution of an oily phase containing a polymer forming material and an initiator material is used as a first step in the encapsulation method and
(b) the liquid crystal is dissolved into the oily phase.

The problem to be solved by the present application may therefore be regarded as providing an alternative method for the encapsulation of liquid crystal materials with narrow capsule size

distribution , having acceptable reproducibility and being simple and independant from the liquid crystal to be encapsulated.

The solution to this problem proposed in **claim 1** is considered as involving an inventive step for the following reasons:
A process for preparing an aqueous emulsion with a narrow droplet size distribution of an oil material including one or more highly water insoluble substances, wherein the oily material is homogenized in a hydrophilic phase, and the emulsion is subsequently diluted with a high proportion of water to form a stable emulsion of the oily material having the desired narrow size distribution is described in the prior art (see **D2.**) However, there is no hint in **D1** leading to the process for preparing an aqueous emulsion with a narrow droplet size distribution of **D2.** Additionally, in **D2** there is no reference to encapsulation of liquid crystal materials. The skilled person would therefore not regard it as a normal option to include these features of **D2** in the method for the encapsulation of liquid crystal materials with narrow capsule size distribution described in **D1** in order to solve the problem posed.

Consequently, the subject-matter of **claim 1** meets the requirements of the PCT with respect to novelty and inventive step.

In the above opinion the term " hydrophilic phase" of claim 1 is understood to mean a mixture of water and an ordinary organic water miscible solvent, as explained in the description (page 8, lines 6-10.)

2.2.

Document **D1** discloses liquid crystal materials encapsulated in a polymeric shell with narrow capsule size distribution. The liquid crystal materials encapsulated in a polymeric shell with narrow capsule size distribution obtained by the method of claim 1 appear not to be distinguishable from those of **D1. D1** also discloses their use in liquid crystal optical devices.

Consequently, the subject-matter of **claim 8** is not novel.

2.3.

In **claim 9** a slight change in the composition of the encapsulated liquid crystal polymer particles of claim 1 and its use in outdoor liquid crystal optical devices are defined, which come within the scope of the customary practice followed by persons skilled in the art, especially as the advantages thus achieved can readily be foreseen.

Consequently, the subject-matter of **claim 9** lacks an inventive step.

2.4.

Claims 2-7 are dependent on claim 1 and, as such, also meet the requirements of the PCT with respect to novelty and inventive step.

3. Other Points

3.1.

The abbreviations of **claim 6** have no well-recognised meaning and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claim unclear **(Article 6 PCT.)**

3.2.

Claims 2 and 3 are not supported by the description as required by **Article 6 PCT**. On page 7, lines 8-12 no reference is made to a liquid crystal material being present in the oily phase.